

WHAT IS CLAIMED IS

1 1. A method for forming a layer on a substrate disposed in a
2 processing chamber, said method comprising:
3 chemisorbing onto said substrate alternating monolayers of a first
4 compound and a second compound, with said second compound having fluorine atoms
5 associated therewith, with each of said first and second compounds being introduced into
6 said processing chamber along with a carrier gas; and
7 controlling a quantity of said fluorine atoms associated with the monolayer
8 of said second compound as a function of said carrier gas.

1 2. The method of claim 1 wherein controlling said quantity of said
2 fluorine atoms further including selecting said carrier gas from a group of gases
3 consisting of nitrogen (N₂), argon (Ar), hydrogen (H₂).

1 3. The method as recited in claim 1 wherein said first compound
2 includes a boron-containing compound.

1 4. The method of claim 1 wherein said refractory metal is selected
2 from the group consisting of titanium (Ti) and tungsten (W).

1 5. The method of claim 1 further including purging said processing
2 chamber following chemisorption of each of the alternating monolayers.

1 6. The method as recited in claim 3 wherein purging said processing
2 chamber includes introducing a purge gas therein.

1 7. The method as recited in claim 3 wherein purging said processing
2 chamber includes pumping said processing chamber to evacuate all gases disposed
3 therein.

1 8. The method as recited in claim 3 wherein purging of said
2 processing chamber includes introducing a purge gas therein and subsequently pumping
3 said processing chamber clear of all gases disposed therein.

1 9. The method as recited in claim 6 wherein said purge gas and said
2 carrier gas have identical constituents selected from a group consisting of nitrogen (N₂),
3 argon (Ar), hydrogen (H₂).

1 10. A method for forming a layer on a substrate, said method
 2 comprising:
 3 serially exposing said substrate to first and second reactive gases, with said
 4 first reactive gas having a first compound associated therewith and said second reactive
 5 gas having a second compound associated therewith, to form alternating monolayers of
 6 said first compound and said second compound, with said second compound having
 7 fluorine atoms associated therewith;

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 8 controlling a quantity of said fluorine atoms associated with the monolayer
 9 of said second compound by introducing into said processing chamber a carrier gas along
 10 with said first and second reactive gases; and
 11 purging said processing chamber following chemisorption of each of the
 12 alternating monolayers.

1 11. The method as recited in claim 10 wherein purging said processing
 2 chamber includes introducing a purge gas therein.

1 12. The method as recited in claim 11 wherein purging said processing
 2 chamber includes pumping said processing chamber to evacuate all gases disposed
 3 therein.

1 13. The method as recited in claim 12 wherein said first compound
 2 includes a diborane (B_2H_6) said second compound is tungsten (W).

1 14. The method as recited in claim 13 wherein said purge gas and said
 2 carrier gas have identical constituents selected from a group consisting of nitrogen (N_2),
 3 argon (Ar), hydrogen (H_2).

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 1 15. A processing system for processing a substrate in a processing
 2 chamber, said system comprising:
 3 means for chemisorbing, onto said substrate, alternating monolayers of a
 4 first compound and a second compound, with said second compound having fluorine
 5 atoms associated therewith, with each of said first and second compounds being
 6 introduced into said processing chamber along with a carrier gas; and
 7 means for controlling a quantity of said fluorine atoms associated with the
 8 monolayer of said second compound as a function of said carrier gas.

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1 16. A processing system for a substrate, said system comprising:
2 a body defining a processing chamber;
3 a holder disposed within said processing chamber to support said substrate;
4 a gas delivery system in fluid communication with said processing
5 chamber;
6 a first temperature control system in thermal communication with said
7 processing chamber;
8 a pressure control system in fluid communication with said processing
9 chamber;
10 a controller in electrical communication with said gas delivery system,
11 said temperature control system, and said pressure control system; and
12 a memory in data communication with said controller, said memory
13 comprising a computer-readable medium having a computer-readable program embodied
14 therein, said computer-readable program including a first set of instructions for
15 controlling said gas delivery system to chemisorb, onto said substrate, alternating
16 monolayers of a first compound and a second compound, with said second compound
17 having fluorine atoms associated therewith, with each of said first and second compounds
18 being introduced into said processing chamber along with a carrier gas, and a second set
19 of instructions to control said gas delivery system to control a quantity of said fluorine
20 atoms associated with the monolayer of said second compound controlling a quantity of
21 said fluorine atoms associated with the monolayer of said second compound by
22 introducing, into said processing chamber, a carrier gas along with said first and second
23 reactive gases.

1 17. The processing system as recited in claim 16 wherein said
2 computer-readable program includes an additional set of instructions to control said gas
3 system to purge said processing chamber by introducing a purge gas therein following
4 chemisorption of each of the alternating monolayers.

1 18. The processing system as recited in claim 16 wherein said
2 computer-readable program includes a further set of instructions to control said pressure
3 control system to purge said processing chamber by evacuating said processing chamber
4 following chemisorption of each of the alternating monolayers.

1 19. The processing system as recited in claim 16 wherein said
2 compound includes a boron-containing compound and said second compound includes a
3 refractory metal compound with said refractory metal compound being from the group
4 consisting of titanium and tungsten and said purge gas and carrier gases each being from
5 the group consisting of nitrogen (N₂), hydrogen (H₂) and argon (Ar).

1 20. The processing system as recited in claim 19 wherein said purge
2 gas and said carrier gas having differing constituents.

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